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(54) Abstract Title
Wireless speaker for radio communication device

(57) A wireless speaker (10) for a radio communication device (12) includes a remote housing with a clothing attachment clip. A receiver circuit is disposed within the housing. The receiver circuit is adapted to receive signals (20) carrying audio information from the radio communication device (12). A battery within the housing powers the receiver. The receiver circuit converts the signals (20) received from the radio communication device (12) to audio signals that are then coupled to the speaker.

The earpiece may be carried on a hookswitch when not in use, which automatically disconnects the headset jack from the receiver and connects the speaker to the receiver. The earpiece may be an earbud, earpiece or headset with a wired connection to the headset jack. The speaker may be clipped to the lapel or another piece of clothing close to the user's ear, so that some privacy may be afforded to the user, and low power levels used. The wireless link from the earphones may be optical, ultrasonic or radio frequency. The mobile communications device may be worn on the users wrist.

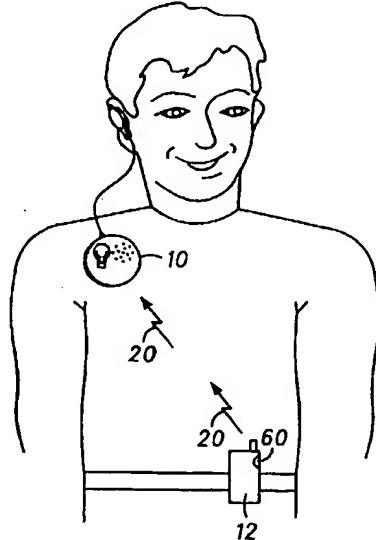


FIG. 4

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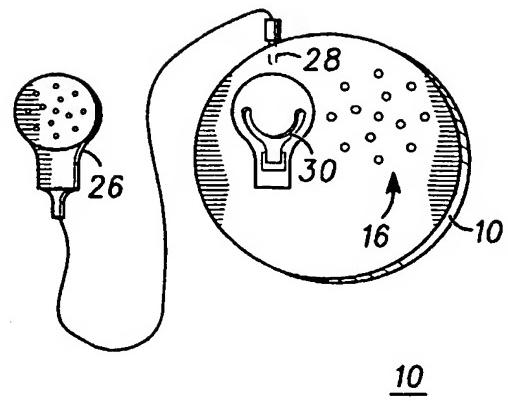
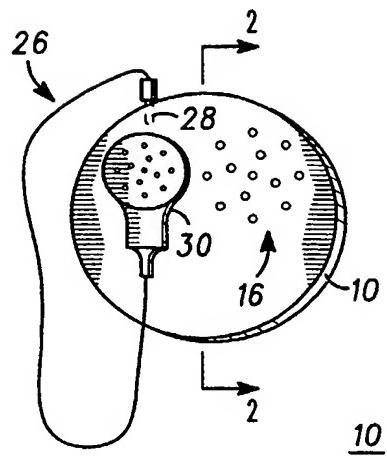


FIG. 1

FIG. 3

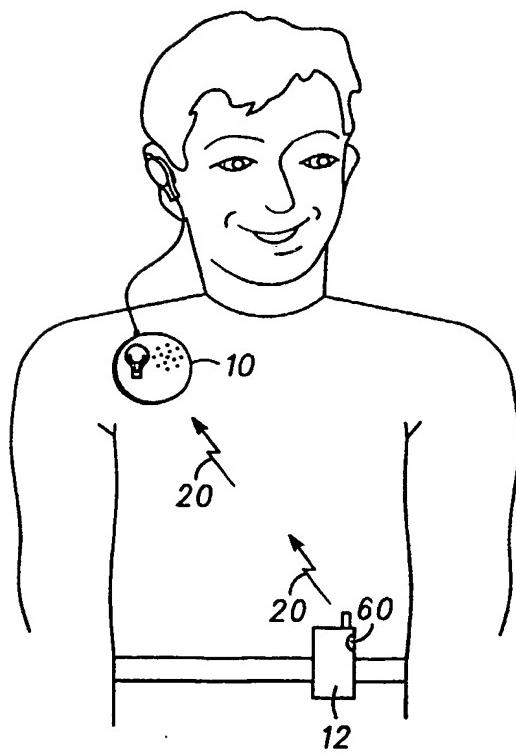
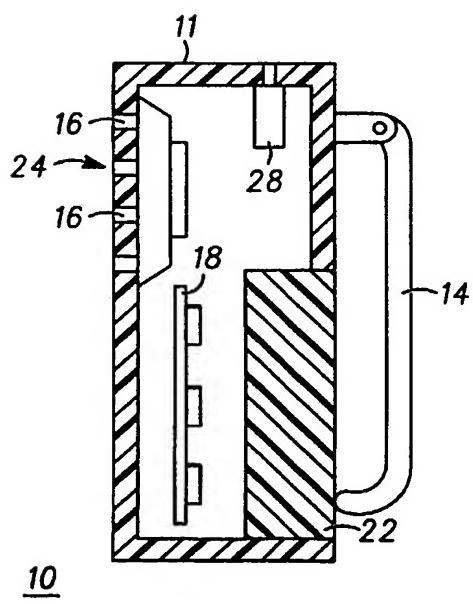
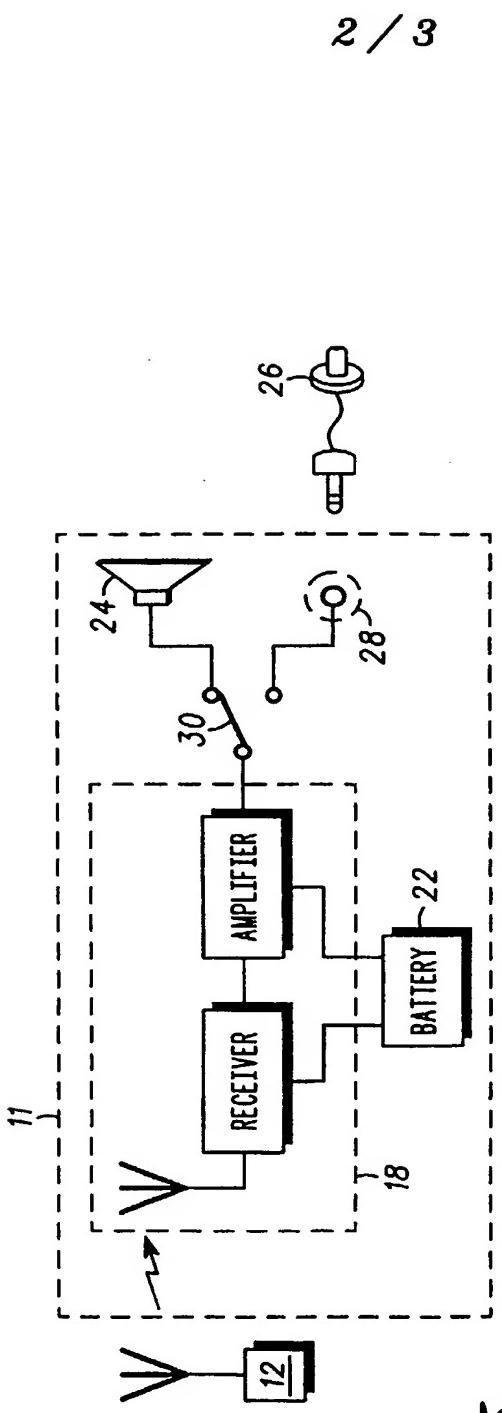


FIG. 2

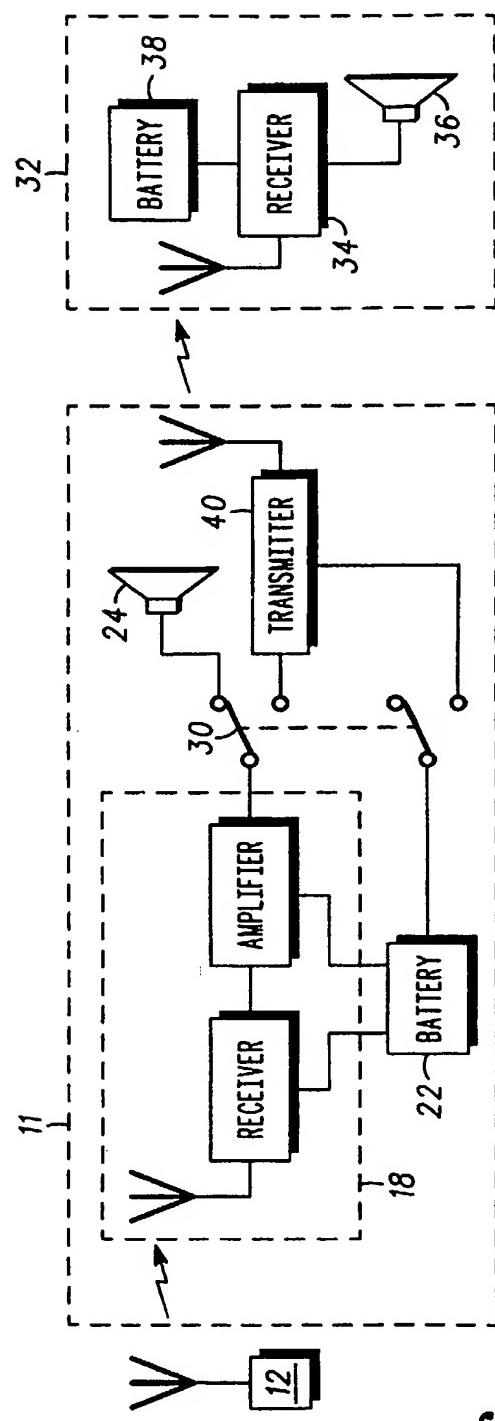
FIG. 4

FIG. 5



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FIG. 6



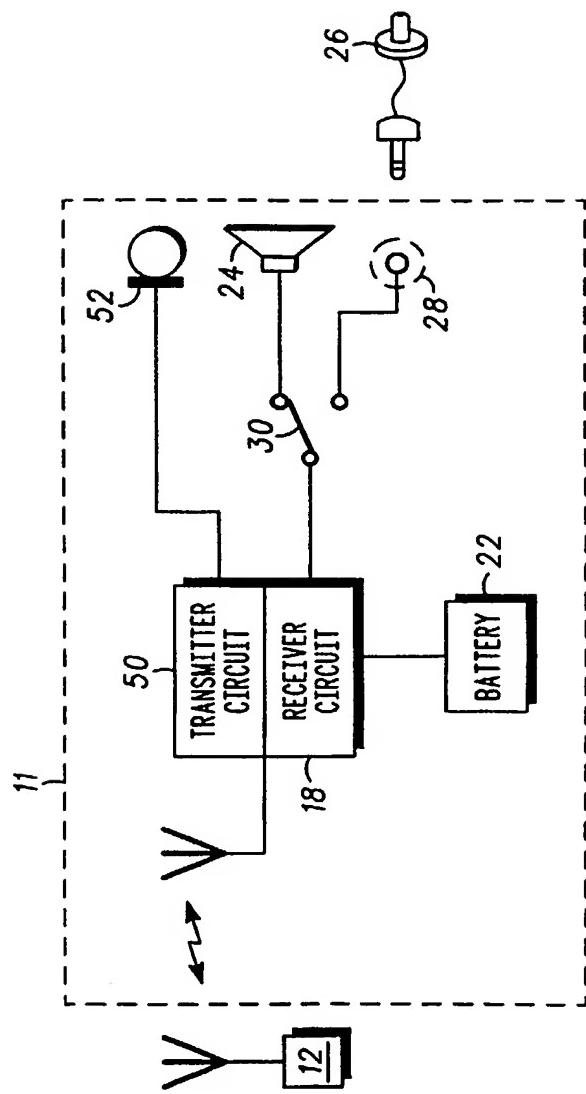


FIG. 7

WIRELESS SPEAKER FOR RADIO COMMUNICATION DEVICE**FIELD OF THE INVENTION**

- 5 The present invention relates generally to radio communication devices, and more particularly to auxiliary audio devices for radio communication devices.

BACKGROUND OF THE INVENTION

- 10 Consumer markets continue to request smaller portable electronic devices that have greater functional features. Examples of such devices include two-way and broadcast radio receivers (i.e., Walkman®), compact disc players, cellular telephones, and computer devices to name but a few. As portable electronic devices have become smaller, a variety of carrying means has been developed.
- 15 These carrying means have included belt-mounted carrying cases that have gained particular acceptance in applications such as portable radios and compact disc players.

Further, as such devices have become smaller, they have become more compatible with wearing in more convenient places, such as, for example, on the belt or wrist. An example of this type of device, might be, for example, a one-way call receiver, such as a portable paging device. Pagers are commonly worn on a holster or belt clip. Wristwatch versions are also available. Radiotelephones, too, have been getting smaller and are now wearable. However, users typically require more privacy with a radiotelephone than a pager. In addition, with some activities it would be beneficial to provide hands-off operation.

Hands-free use with cellular phones is becoming increasingly important with new regulations governing the use of cell phones in cars and the desire to do other activities while talking on the cellular phone. Traditionally, hands-free devices included either a wired earpiece that extends from the cellular phone to the user's ear, or a speaker phone that does not provide complete privacy during a call.

Accordingly, there is a need for a wearable radio communication device that can be operated hands-free and that provides an easy-to-use privacy mode of operation. It would also be an advantage to provide different levels of privacy depending on the user's needs.

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BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a perspective view of a wireless speaker, in accordance with
10 the present invention;

FIG. 2 illustrates a cross-sectional side view of the wireless speaker of FIG. 1;

FIG. 3 shows another perspective view of a wireless speaker with the earpiece removed from the hookswitch in accordance with the present invention;

FIG. 4 illustrates a front view of an operational mode of the wireless speaker
15 and a radio communication device, in accordance with the present invention;

FIG. 5 shows a simplified schematic diagram of a preferred embodiment of the wireless speaker of FIGs. 1 to 3;

FIG. 6 shows a simplified schematic diagram of a first alternate embodiment
20 of a wireless speaker with a wireless earpiece, in accordance with the present invention; and

FIG. 7 shows a simplified schematic diagram of a second alternate embodiment of a wireless speaker with two-way communication capabilities, in accordance with the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention provides a radio communication device that allows a user the option of hands-free operation with a wireless speaker device that can be switched between a private mode of operation with an earpiece and a semi-private mode with a lapel speaker. The proximity of a lapel speaker to a user's ear allows the device to be smaller and consume less power. In addition, a much shorter wired earpiece can be used that will not get tangled as in those prior art cases where the earpiece wire is extended directly to the communication device.

While the specification concludes with claims defining the features of the invention that are regarded as novel, it is believed that the invention will be better understood from a consideration of the following description in conjunction with the drawing figures, in which like reference numerals are carried forward. A radiotelephone is a communication device that communicates information to a base station using electromagnetic waves in the radio frequency range. The radiotelephone can be strapped to, or otherwise secured to, a person's wrist, belt, or other holder.

The radiotelephone portion of the communication device is preferably a cellular radiotelephone adapted for personal communication or personal computing, but may also be a pager, cordless radiotelephone, or a personal communication service (PCS) radiotelephone. The radiotelephone portion may be constructed in accordance with an analog communication standard or a digital communication standard. The radiotelephone portion generally includes a radio frequency (RF) transmitter, a RF receiver, a controller, an antenna, batteries, a duplex filter, a frequency synthesizer, a signal processor, and a user interface including at least one of a keypad, control switches, a display, and a microphone. The radiotelephone portion can also include a paging receiver. If the device incorporates a pager, there can be a small liquid crystal display and an audio annunciator. The electronics incorporated into a cellular phone, two-way radio or selective radio receiver, such as a pager, are well known in the art, and may be incorporated into the electronic unit.

Referring now to FIGs. 1-5, there are illustrated various views of a wireless speaker 10 for radio communication device 12, in accordance with the present invention. A remote housing 11 includes a clothing attachment clip 14. The housing 11 is adapted to clip to the clothing of the user in proximity to the user's ear (as shown in FIG. 4), and preferably clipped to a lapel of the user. The clip can be oriented in various directions. Further, it should be recognized that the clip can be replaced with a clasp, pin, or other fastener equally, without affecting the enablement of the present invention. The housing can be of any shape or form, but is preferred to be small to provide comfortable use. The housing includes apertures 16 to allow acoustic information to pass therethrough. A receiver 18 is disposed within the housing 11. The receiver is adapted to receive signals 20 carrying audio information from the radio communication device 12. Preferably, the radio communication device includes a separate transmitter, apart from its transceiver circuits for communicating with a base station, for transmitting the audio signals to the receiver in the housing. The separate transmitter and the receiver in the housing utilize a wireless link including one of an optical link, RF link, and an ultrasonic link. The receiver 18 includes circuits that are well known in the art and can include, printed circuit boards, an antenna, a mixer, down conversion circuitry, baseband circuitry, filtering, an amplifier, digital signal processing circuitry, a volume control, and the like. A battery 22 is disposed within the housing 11 for powering the receiver circuits 18. A speaker 24 is disposed within the housing 11 and behind the apertures 16. The receiver 18 converts the signals 20 received from the radio communication device 12 to audio signals coupled to the speaker 24.

Several modes of operation of the present invention can be used. Firstly, the radio communication device can be used by itself without the wireless speaker. Although this is a trivial result, it should be noted that the present invention does not inhibit or alter the normal operation of the communication device. A first embodiment of the present invention permits a private speaker mode of operation with an earpiece. A second embodiment of the present invention permits a semi-private mode where the user can hear the speaker, but few others surrounding the user can.

Preferably, the present invention includes an earpiece 26 containing an electromechanical transducer disposed therein, a headset jack 28 for coupling signals from the receiver 18 to the earpiece 26, and a hookswitch 30 for carrying the earpiece 26 when the earpiece is not in use. In particular, the earpiece 26 includes

5 one of an earbud, an earpiece, and a headset. In operation, when the earpiece 26 is carried on the hookswitch 30 (as shown in FIG. 1), the hookswitch disconnects the headset jack 28 from the receiver 18 and connects the speaker 24 to the receiver 18. This provides a semi-private mode of operation. Advantageously, the speaker can be driven at low power levels such that only the user can clearly hear the

10 speaker. When the earpiece 26 is removed from the hookswitch 30 (as shown in FIG. 3), the hookswitch 30 connects the headset jack 28 to the receiver 18 and disconnects the speaker 24 from the receiver 18. The actual switch could be removed from the holding detail 30 and placed in the headset jack 28. In this case, when the earpiece 26 is not plugged into the jack 28 the speaker 24 is connected to

15 the receiver 18 to provide the semi-private speakerphone operation. When the earpiece 26 is plugged into the jack 28, the speaker 24 is disconnected from the receiver 18 and the receiver 18 is connected to the earpiece 26 to provide private mode operation.

For ease of implementation, less complex circuitry, and less battery power

20 drain, it is preferred that the earpiece 26 provides a wired connection to the headset jack 28 as shown in the figures. However, it is also contemplated that a wireless earpiece can be used. In a wireless earpiece embodiment as shown in FIG. 6, the wireless earpiece 32 contains an earpiece receiver 34 coupled to an electromechanical transducer 36 disposed therein. The earpiece receiver 34 is

25 powered by an earpiece battery 38. An earpiece transmitter 40 is disposed in the housing 11 and powered by the wireless speaker battery 22. The earpiece transmitter 40 couples signals from the receiver 18 to the earpiece 32. The wireless earpiece receiver 34 is coupled to the transmitter 40 via one of an optical, ultrasonic, and radio frequency wireless link. Similarly, to the representation of FIGs. 1 and 3

30 (but without the wired earpiece 26), a hookswitch 30 is adapted to hold and carry the wireless earpiece 32 when the wireless earpiece 32 is not in use. The hookswitch

30 also serves to direct audio signals from the receiver 18. For example, when the earpiece 32 is carried on the hookswitch 30, the hookswitch 30 powers off the transmitter 40 and connects the receiver 18 to the speaker 24, and when the earpiece 32 is removed from the hookswitch 30, the hookswitch 30 powers up the transmitter 40 and disconnects the speaker 24 from the receiver 18.

The above embodiments provide a one-way wireless link from the radio communication device to the wireless speaker. In an alternative embodiment, a two-way communication link is provided between the radio communication device and the wireless speaker. In the two-way embodiment, as shown in FIG. 7, a transmitter 10 50 is disposed within the housing 11 and powered by the battery 22. In addition, a microphone 52 is disposed in the housing 11 and coupled to the transmitter 50. The microphone 52 couples audio signals to the transmitter 50. The transmitter 50 is adapted to convert and transmit the audio signals to the radio communication device 12. The receiver circuit 18, hookswitch 30 and speaker 24 operate as described 15 previously. In this embodiment, a wired earpiece 26 is used for simplicity, connecting to a jack 28 in the housing 11. However, a wireless earpiece can also be utilized as described previously. The receiver circuit 18 and transmitter circuit 50 include other circuitry such as a duplexer or other device as is known the art to allow connectivity to a single antenna.

With two-way communication available, it is possible for the hookswitch 30 to activate and end a call by sending appropriately coded signals to the radio communication device 12. For example, to dial a call a user removes the earpiece from its hookswitch cradle 30 which directs the transmitter 50 to deliver a coded message to the radio communication device 12 to begin a call. The user then enters 20 dialing information through a suitable user interface and the call is connected. For incoming calls, the radio communication device 12 sends a coded message to the receiver 18 of the wireless speaker. Preferably, the coded message also causes an audio alert at the speaker 24, indicating to the user that there is an incoming call. The user then removes the earpiece from the hookswitch which directs the 25 transmitter to send an acknowledgment signal to the radio communication device directing it to connect the call. At the end of the call the user replaces the earpiece 30

on the hookswitch which directs the transmitter to send a coded signal to the radio communication device to end the connection.

- In a preferred embodiment, the communication device includes a charging cradle 60 or holster, as shown in FIG. 4, to electrically and mechanically couple to at least one of the housing 11 and earpiece 32 when not in use so as to provide battery charging. In particular, the charging cradle or holster has mechanical and electrical contacts for receiving, holding, and charging the housing battery 22, and the earpiece battery 38 (if the wireless earpiece embodiment is utilized).

- It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Accordingly, the invention is intended to embrace all such alternatives, modifications, equivalents and variations as fall within the broad scope of the appended claims.

CLAIMS

What is claimed is:

1. A wireless speaker apparatus for a radio communication device, comprising:
5 a remote housing with a clothing attachment clip;
 a receiver disposed within the housing, the receiver adapted to receive signals
 carrying audio information from the radio communication device;
 a battery disposed within the housing for powering the receiver; and
 a speaker disposed within the housing, the receiver converts the signals received
10 from the radio communication device to audio signals coupled to the speaker.

2. The wireless speaker apparatus of claim 1, further comprising:
an earpiece containing an electromechanical transducer disposed therein;
a headset jack for coupling signals from the receiver to the earpiece; and
a hookswitch for carrying the earpiece when not in use, such that
 - 5 when the earpiece is carried on the hookswitch, the hookswitch disconnects the headset jack from the receiver and connects the speaker to the receiver, and
 - when the earpiece is removed from the hookswitch, the hookswitch connects the headset jack to the receiver and disconnects the speaker from the receiver.
- 10
3. The wireless speaker apparatus of claim 1, wherein the earpiece provides a wired connection to the headset jack, and the earpiece includes one of an earbud, an earpiece, and a headset.
- 15
4. The wireless speaker apparatus of claim 1, further comprising:
a transmitter disposed in the housing and powered by the battery; and
a microphone disposed in the housing and coupled to the transmitter, the
microphone for coupling audio signals to the transmitter, the transmitter is
adapted to convert and transmit the audio signals to the radio communication
device.
- 20
5. The wireless speaker apparatus of claim 1, wherein the housing is adapted
to be clipped to clothing of the user in proximity to the user's ear.
- 25
6. The wireless speaker apparatus of claim 5, wherein the housing is adapted
to be clipped to a lapel of the user, and the speaker is driven at low power levels
such that only the user can clearly hear the speaker, thereby providing a semi-
private operating mode.
- 30
7. The wireless speaker apparatus of claim 1, further comprising:

a wireless earpiece containing an earpiece receiver coupled to an
electromechanical transducer disposed therein and powered by an earpiece
battery;

5 an earpiece transmitter disposed in the housing and powered by the battery, the
earpiece transmitter for coupling signals from the receiver to the earpiece;
and

10 a hookswitch for carrying the wireless earpiece when not in use, such that
when the earpiece is carried on the hookswitch, the hookswitch powers off
the transmitter and connects the receiver to the speaker, and
when the earpiece is removed from the hookswitch, the hookswitch
powers up the transmitter and disconnects the speaker from the
receiver.

15 8. The wireless speaker apparatus of claim 7, wherein the earpiece receiver is
coupled to the transmitter via one of an optical, ultrasonic, and radio frequency
wireless link.

20 9. The wireless speaker apparatus of claim 1, wherein the communication
device includes a charging cradle to electrically and mechanically couple to at least
one of the housing and earpiece when not in use so as to provide battery charging.

25 10. The wireless speaker apparatus of claim 1, wherein the communication
device is worn on the user's wrist.



INVESTOR IN PEOPLE

Application No: GB 0103080.8
Claims searched: 1-10

Examiner: Robert Shorthouse
Date of search: 21 November 2001

Patents Act 1977

Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): H4L (LESF, LEUF, LEUX), H4J (JL), H3Q (QAH)

Int Cl (Ed.7): H04M 1/02, /05, /60, H04B 1/08, /38

Other: Online: WPI, EPODOC, JAPIO, INSPEC

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X:Y	GB 2336966 A (TOOTH) See abstract and figure 1	1, 3-6: 10
Y	GB 2316788 A (CONSUMER) See figure 1	10
X:Y	WO 94/299966 (ERICSSON) See figure 7 and page 3 lines 4-22 A1	1, 3-6: 10
X, P	DE 20008751 U1 (HSU) See Figure 5	1, 3-6

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.